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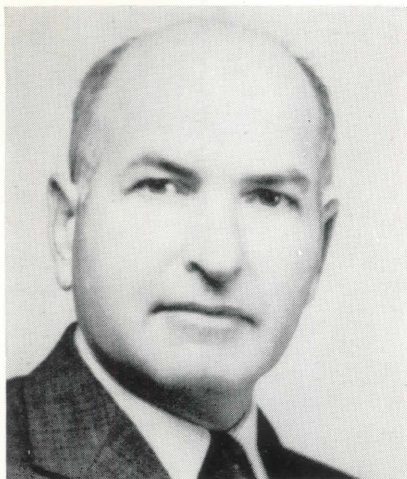
March, 1963

# FLORIDA ARCHITECT

OFFICIAL JOURNAL of the FLORIDA ASSOCIATION OF ARCHITECTS of the AMERICAN INSTITUTE OF ARCHITECTS, INC.







# Edwin T. Reeder

## FAIA

### 1908 - 1963

Prominent civic leaders, architects, and friends of Edwin T. Reeder, FAIA, mourn his untimely death as a loss to both the community and profession. He is survived by his gracious wife Ruth, teenage son Edwin S. Reeder, and business partner Everett M. Eignus.

On December 14, 1908 he was born to Algenore and Edwin C. Reeder at Laurium, Michigan. He graduated in the class of 1931 as a Bachelor of Science in Architecture from the University of Illinois.

Later he worked his way from draftsman in 1935 to the position of partner ('39-'41) in the firm of Weed and Reeder Architects. During the early phase of World War II Reeder served the Civil Engineer Corps U. S. Navy in helping to establish the original requirements for "Seabees". Following a tour of duty in charge of "Seabee" recruiting within the area of the Rocky Mountains to the Pacific coast, he served overseas with the 19th Construction Regiment and 75th Naval Construction Battalion in the South Pacific as Executive Officer in charge of a unit of 1200 construction specialists. Later he commanded the U. S. Naval Reserve Construction Company 6-12 at Miami and advanced to the rank of Captain, CEC, USNR.

From 1946 to the present, he and partner Everett M. Eignus have guided the firm of EDWIN T. REEDER ASSOCIATES, ARCHITECTS AND ENGINEERS, in the completion of many projects including civic buildings, financial institutions, Army-Navy-Air Force Facilities, hospitals, Commercial buildings, and Residences.

As a partner in CODA (County of Dade Architects), Reeder designed the handsome new Metropolitan Dade County Justice Building and Jail in the Civic Center.

The firm of Edwin T. Reeder Associates has received recognition in the form of the following awards: Industrial National Bank, ALCOA Achievement Award; Central National Bank, Award of Honor FAA Convention 1958; Dade Federal Savings & Loan Association, Edison Center Branch, Award of Merit for Architectural Excellence, South Atlantic Region AIA; South Florida State Mental Hospital, Award of the "Modern Hospital of the Month" plaque by Modern Hospital Publishing Company;

Designer's and Decorator's Guild Honorary Membership Award in recognition of substantial and continuous contributions to the interest of good design and attractive living.

His work has been published in national magazines including: TIME, FORTUNE, INTERIORS, BRICK AND TILE (Structural Clay Products), and HOUSE AND GARDEN.

Reeder's dedicated service to the Institute is well known among his fellow architects. Chief offices which he held in the AIA include the following:

President, South Florida Chapter AIA 1954; Director, South Florida Chapter AIA 1955, '56, '57; Member National Committee on Publications AIA 1956; Chairman Budget Committee Florida Association of Architects 1956, '57, '58; Chairman South Atlantic Region AIA Convention Committee 1952; and Chairman of numerous Chapter committees since 1943.

Reeder generously gave his time and worked in a leadership capacity on the following civic and other professional groups:

Dade County Contractor's Examining Board Chairman 1947 thru '57; Combined Examining Boards (Miami, Miami Beach, Dade County) Chairman 1954 thru '57; NCARB Examining Board Georgia Institute of Technology 1955; Technical Committee member writing new South Fla. Building Code 1956-57; Director, The Cancer Institute at Miami, 1954 thru '58; Member Extension Committee, National Council of Christians and Jews 1953 to present; Member Kiwanis International Scholarship Committee 1955 until death; Chairman Dade County Metropolitan Planning Board; Chairman Dade County Architectural Committee for Civic Center Development; Director Miami Chamber of Commerce 1950 to present; Chairman Fine Arts Committee, Inter-American Cultural & Trade Center 1956-57; Member Architectural & Engineering Control Committee for Inter-American Cultural & Trade Center 1956-57; Member Exhibition Committee, "Design Derby", sponsored by Designer's and Decorator's Guild 1958 to present; Member Florida State Board of Architecture from 1961 to present.

The profession and the entire Florida community has indeed lost a most valuable citizen.

—Murray Blair Wright



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# The Florida Architect

OFFICIAL JOURNAL OF THE FLORIDA ASSOCIATION OF ARCHITECTS

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### THE COVER . . .

The first conclusive research in well over three hundred years has resulted in the achievement of Dr. Turpin C. Bannister, F.A.I.A., Dean of the College of Architecture and Fine Arts, University of Florida, which establishes definitely facts regarding the basic planning and design of Old Saint Peter's at Rome. The cover drawing by Dr. Bannister — Transept interior reconstruction, looking north — is one evidence of his scholarly conclusion to a problem of architectural detection that has no counterpart. In the drawing and the substance of the article which starts on page 10, Dr. Bannister has developed a significant archaeological conclusion to a problem which has baffled scholars ever since the destruction of the magnificent monument which has been the focus of his untiring attention for almost half a decade.

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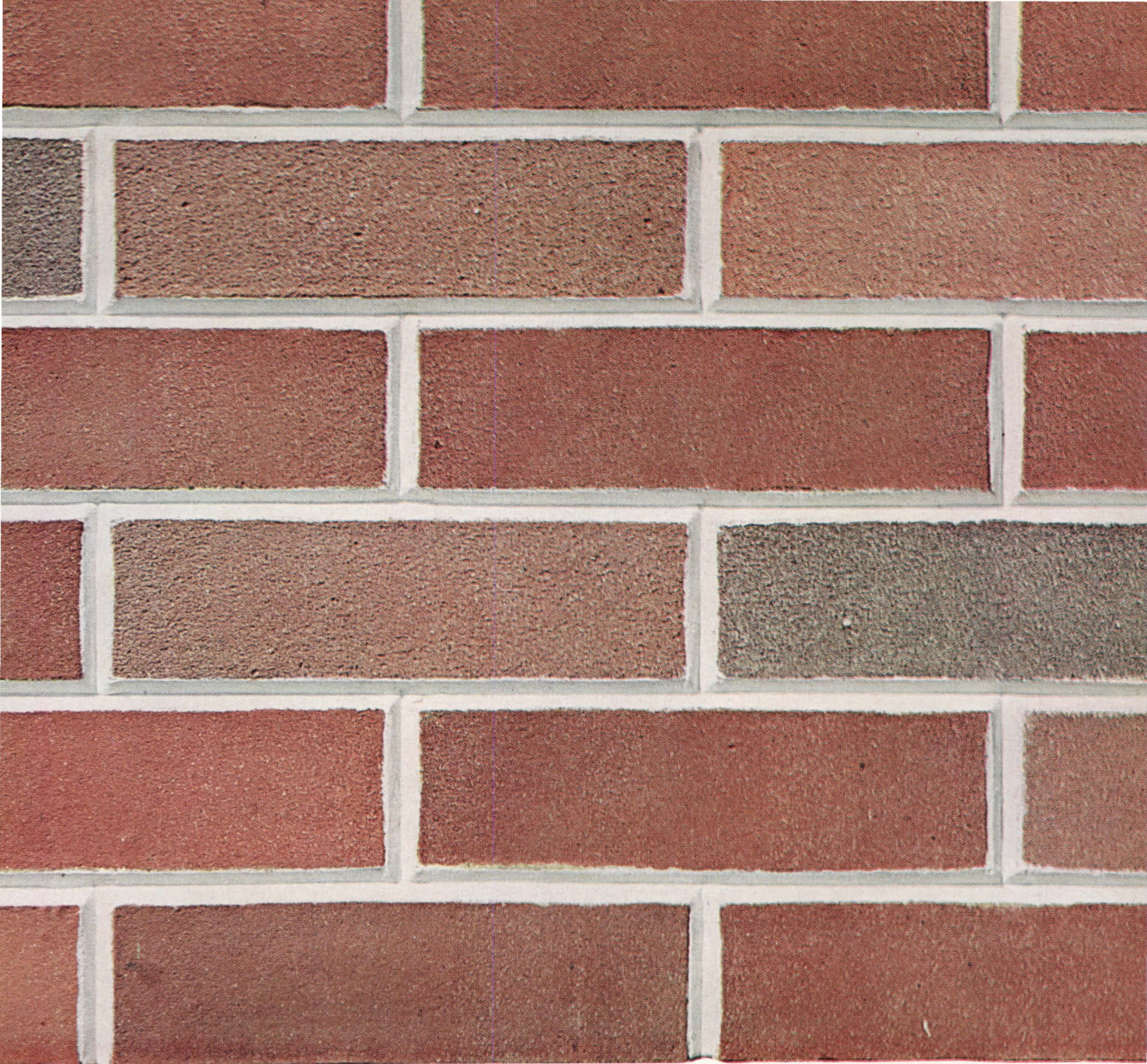
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# Current Highlights...

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- **THE ECONOMY IS STILL ONLY AMBLING ALONG** these days — moving up fairly slowly. There are bright spots . . . which get most of the attention . . . but the over-all picture has shown little net gain for many months now. Not even President Kennedy's tax proposals . . . if approved by Congress as submitted . . . are expected to bring much stimulation to business before the end of 1963.

... The key indicators are still a mixed bag of bouncy gains and disappointing dips. If retail sales rise, then new orders slip. The advance on a wide front that is characteristic of a vigorous expansion still has not developed. Instead, the impressive pluses are — so far — only exceptions to the rule.

... After making allowances for purely seasonal changes, many economists conclude that the economy hasn't done much since July. What net increases there have been are regarded as largely unsatisfactory. These analysts are hoping that improved psychology will operate to speed things up. But, up to now, there is little evidence of such improvement.
- **SOME OF THE STATISTICS HAVE BEEN SURPRISINGLY WEAK.** For example, unemployment has not really declined. It is still 5½% of the labor force. Or take industrial output: The index read 119 in July but is only a point or so above this level now. And surveys suggest that the expenditures of business for new plant and equipment may be in a dip — if only temporary.

... The economy has its positive side, of course — the things that have sparked today's business optimism. Big auto sales are lifting activity in steel, auto parts, rubber, and textiles. Other retail sales are up. And home-building stays strong.
- **BUT THE PLUSES AREN'T ENOUGH TO SPUR THE ECONOMY** into moving faster. Indeed, the early months of 1963 have witnessed some usual seasonal easing. Even the President's economic advisers aren't being very optimistic about the rest of 1963. They are assuming a rise of only 4.3% in total output. (By contrast, the gain was 6.7% in '62.) Price rises could cut this to 3%.

... And even this modest appraisal assumes that taxes will come down a notch in July. Actually, the monumental complexity of the President's tax program makes October more likely.
- **HOPE FOR AN EARLY SPEED-UP IN BUSINESS ACTIVITY** rests primarily on the advance psychological impact that the recommended tax cuts may have. At this time, government expenditures are the main expansionary factor in the picture. Federal outlays are expected to rise by \$5 billion in 1963; spending by states and localities will rise by \$3 or \$4 billion. But the other two key determinants of business trend — consumer buying and outlays by business for inventory and plant — can still use substantial stimulation.

... If the prospect of tax cuts makes families and businessmen feel a little better off, they may loosen the pursestrings and pep up these lagging areas. Consumers may feel able to buy autos, appliances, etc. more freely. And industry may be moved to add to plant, to be ready for larger sales. But if Congress delays, the psychological effect may be nil.
- **THE ECONOMY WON'T RETURN TO A FULL EMPLOYMENT LEVEL** till '65 or '66, according to projections of Kennedy's economic advisers. (Full employment is a level of activity in which 4% of the labor force or less is jobless.) This is when Kennedy's entire tax package will finally have taken effect. But the Budget won't come into balance until later than this — until 1967. *(Continued on Page 6)*



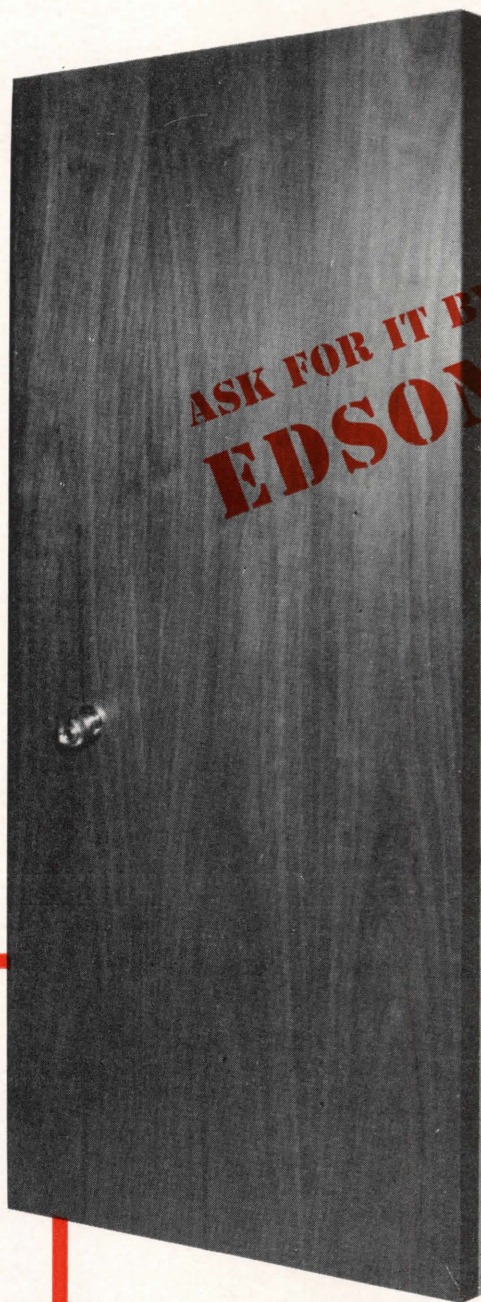
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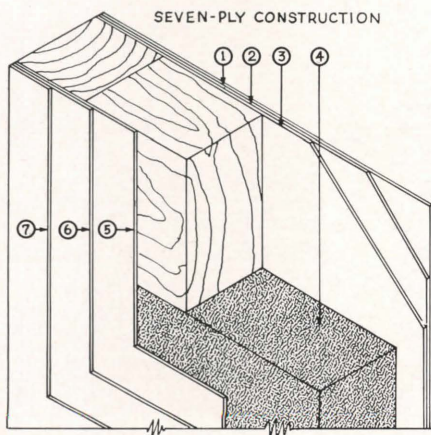
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... Some analysts don't think you'll see full employment before 1970. For one thing, they feel that automation and improved efficiency will erase jobs faster than expansion can create them. For another thing, the post-war baby crop, which is already swelling the labor force, will swamp it by 1965-66.

- **KENNEDY SEEMS LIKELY TO GET A TAX BILL** this year, to judge from the progress that has been made to date. But the word from Capitol Hill still is that there'll be drastic changes in the specifics of the proposals that were made. There's still opposition to the "reforms"—at least in their original version. And the amount of revenue to be lost may be pared down.
- **UNEMPLOYMENT SEEMS MORE LIKELY TO INCREASE** in 1963 than to decline. That's because population growth keeps adding new young workers each year. Indeed, the net amount added annually ranges between 800,000 to 1,200,000. If business does not pick up, this additional manpower cannot be absorbed. And, as noted, business is not expected to spurt . . . even if taxes are cut. What's more, increasing output per man-hour means that any extra production can be turned out with little . . . if any . . . rise in the number on payrolls.

... So the number of unemployed may climb by 500,000 or so, for 1963 as a whole. The jobless could exceed 6% of the labor force—giving Washington new cause for concern. But rising unemployment may mean new support in Congress for tax cuts.



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- **THE RECENT RASH OF STRIKES IS LIKELY TO CONTINUE** through the spring and summer. Negotiations involving more than 3 million workers are coming up in such fields as steel . . . aluminum . . . railroads . . . rubber . . . utilities . . . and electrical equipment. Labor experts detect a new toughness on the part of both labor and industry. This, alone, is expected to produce 50% more strikes in 1963 than last year's 3,500, which involved 1,250,000 workers. And where strikes can be averted, the negotiations may be long and bitter.

... What's behind the upsurge in labor unrest?

... **The unions** will be gunning for big packages of wages and fringe benefits. But their biggest concern — not always shown on the surface — is to protect the jobs of members from alleged ravages of automation and new technology.

... **Management**, however, has been stiffening its resistance, more and more. Competition makes it hard to pass on cost increases to consumers. So new labor costs only add to the pressure on already hard-pressed margin of profit.

... One result of the strike activity may be Congressional action to give the government a bigger voice in collective bargaining. This doesn't necessarily mean compulsory arbitration. But it may lead to some increased authority for fact-finding boards to recommend settlements . . . to be enforced by public opinion

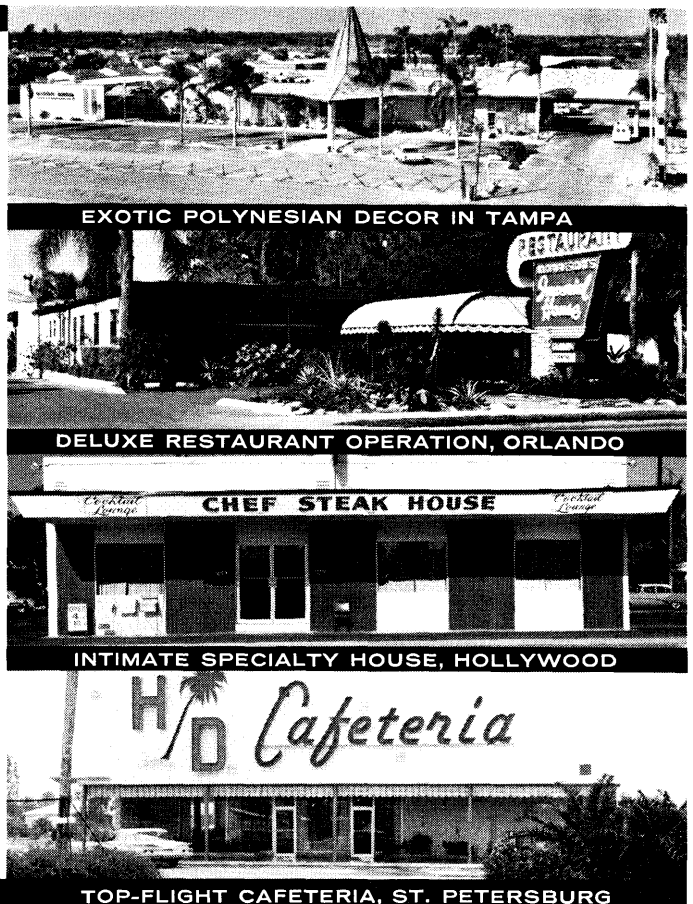
... **It's going to be harder to resist Union demands** as a result of the settlement in the longshoremen's strike in January. The way some labor experts see it, the President's interference — with Senator Morse carrying the ball — meant a 5% increase in business costs. Hereafter, union chiefs will refuse to settle under Presidential guidelines . . . as some did in '62.


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# Aluminum... Color and Finishes

By ROBERT E. FISHER

**This is the second part of an article by an expert on the characteristics and uses of aluminum. The first part which appeared in the November 1962 issue of *The Florida Architect*, dealt with a clarification of the general limitations and potentialities of aluminum, as a material for architectural design. This one is concerned with an equally important subject.**

Our preceeding article was restricted to the study of basic aluminum and its fabrication. In this article we shall discuss the various methods of finishing and their respective merits. It is in this area that aluminum has become most confusing to the designer. A certain amount of this confusion has been caused by misinformation in the past and the introduction of a maze of processes during recent years.

No attempt shall be made to delve deeply into the metallurgical or chemical processes involved except as is deemed necessary to more fully explain the resultant finish. Certain technical aspects and compounds of some processes are trade secrets and are treated only in general terms.

Pricing varies greatly between and within the various processes and is usually governed by such variables as time, size and shape of the work, quantities involved, etc. Therefore we must restrict our discussion again to rather general comparisons. Detailed information on these matters can be obtained from manufacturers or firms specializing in finishing.

As we all know, one of the inherent values of aluminum is the "built in" protective oxide coating which forms naturally on the surface of the metal. This coating is both an advantage and problem. If the aluminum is to be used in the natural "as rolled" or "as extruded" condition, the coating offers a degree of protection from at least a portion of the corrosive and abrasive elements that will normally attack the metal. If the fabricated product is to be painted, soldered, or welded, the oxide coating must be removed and the finishing or joinery operations carried out within a relatively short time. With the exception

of a few products such as low cost residential windows, flashings, industrial roofing and siding, or unexposed metal, the products used in the architectural market are subjected to some form of finishing operation.

First we shall consider the mechanical finishes. These can be used as the ultimate final finish or may be combined with one of the other processes to achieve a specialized finish. These operations range from highly polished and buffed to rough shot blasted surfaces. In between we have a range of belt sanded, hand rubbed, wire wheel, and sand blast finishes used either singly or in combination to achieve the desired effect. Within each category there are a variety of grits and meshes to create additional variations.

Pricewise it can be assumed that the more highly polished the surface the more expensive the finishing costs will be. It should also be pointed out that belt operations can become quite difficult and expensive to perform on offset or uneven surfaces. If the finishes achieved by these methods are to be used as the final surface treatment they should be protected by clear lacquer or plastic coatings. If not, the oxide coating which has been removed will soon re-form and cause the product to take on rather dull appearance. In some cases this may be desirable from an esthetic standpoint.

Another type of finish which has become increasingly popular during the past few years is the organic or paint finish. Early organic finishes left much to be desired; however with the advent of the synthetic resins applied over a primer or conversion coating (to be discussed later) this type of finish provides a very satisfactory and moderately priced surface.

The materials in general use are

the alkyds, acrylics, polyesters, vinyls, epoxies, melamines, and butyrates, to name but a few. The most commonly used have been the alkyds; however the acrylics and epoxies have recently become very popular. The vinyls offer excellent flexibility but, sometimes suffer from poor color retention in outdoor exposures. Paint finishes find their greatest use in such items as aluminum panels and residential as well as commercial siding. Such mass markets make ideal applications as the material can be roller coated at the mill, baked and sent in roll or sheet form to the fabricator. Because of the flexibility of the coatings they can be roll formed in the painted state. Organic finishes can also be readily applied to extruded shapes. Lacquers have been generally losing out to the more exotic resins; however they are still used in some cases where special effects such as copper and gold tones are required.

When specifying paint finishes it is well to consult a fabricator to select proper paint for the application.

One of the lesser known but excellent finishes for aluminum is porcelain enamel. For many years it was felt that this process was not adaptable to aluminum because of the high firing temperature required. However E. I. DuPont de Nemours & Company along with Ferro Corporation and Pemco Corporation developed low-fire frits which were ideal for application on aluminum. The process requires only three basic steps; cleaning, pre-treatment, and enameling. After cleaning, the metal is pre-fired to "fix" the oxide. Following this operation the frit is applied by spraying and the work is fired at a temperature range of 970° to 1000° F. The result-

*(Continued on Page 20)*

# A Venture Toward Verity

By TURPIN C. BANNISTER, FAIA

Dean College of Architecture and Fine Arts

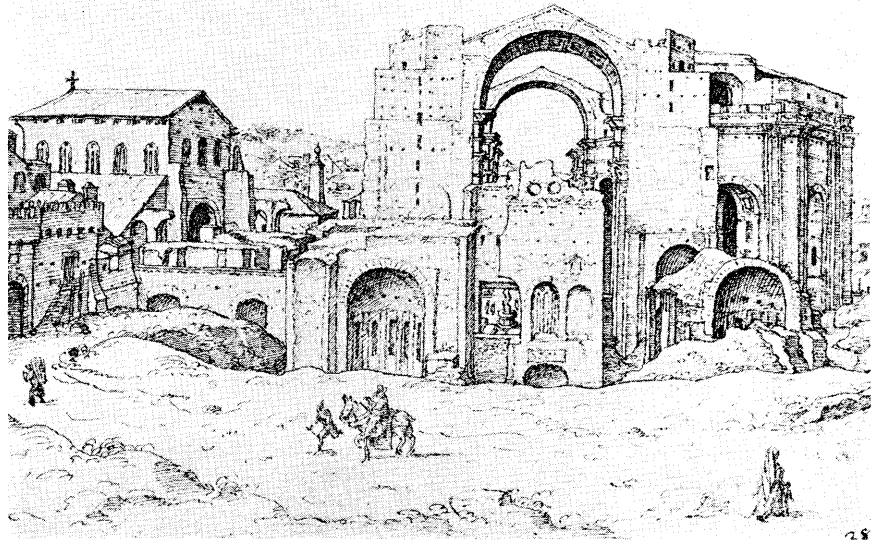
University of Florida

. . . The results of a three year research into the Metrology, Geometry, and Symbolism of the Constantinian Basilica of Saint Peter at Rome . . .

During the second quarter of the fourth century there arose on the eastern slope of the Vatican hill in Rome a magnificent basilica initiated by Constantine the Great to enshrine the grave of Peter, the preeminent apostle, first bishop of the capital, and its most revered martyr. The fame of Peter soon made his shrine the outstanding goal of western pilgrims and his basilica the best known medieval church. In the sixteenth and early seventeenth centuries the venerable structure was replaced by its present resplendent successor, but now, even after three hundred years, this substitute still lacks a whole millenium of equaling the eloquent associations that once radiated from Constantinian walls. (Fig. 1)

The form of Old St. Peter's is well known, but curiously it has received no convincing graphic reconstruction of the interior. The recovery of new data in the 1940's suggests that the time is ripe for a new effort. In the course of preparing such drawings, certain discoveries have emerged regarding the metrology, geometry, and symbolism of the design. This paper summarizes these findings.

The plan, published in 1590 by the Vatican cleric Tiberio Alfarano, reveals the elements of the basilica. (Fig. 2) On the east, broad steps mount to the terrace and gatehouse. Beyond lies the atrium. Although side arcades are shown, it now seems certain that they had never been built. On the west beckons the arcaded narthex accented at the center by a single projecting bay. Entering the portals, we see the long nave lined on each side by a file of twenty-one columns outside which lie pairs of aisles separated by arcades. Westward, nave and aisles open into a great transverse hall, the transept, the first ecclesiastical example of its kind. Opposite the



**Figure One. St. Peter's: View from north, c 1539, by Marten van Heemskerck. At the left stands the eastern half of Constantine's nave made usable by the temporary wall of 1538. At the right rise Bramante's piers and arches of the new basilica begun in 1506. Beneath the northern arch stand the remains of Constantine's transept.**

triumphal arch joining nave and transept, stands the semi-circular apse framing the focal shrine, which encased the small *trophy* (martyr shrine) that since the mid-second century had marked the apostle's grave.

In addition to numerous topographical sketches showing elements of the design, other sources add the dimensions required for accurate reconstruction. First is the official report of the archaeological investigations of the 1940's. Its most important contribution is the exact transverse dimensions of the northern half of the nave. These were obtainable because in surviving portions of a temporary wall, erected in 1538 to allow use of the eastern half of the nave during construction of the new church, are embedded a piece of the northern aisle wall, one column base of both arcade and colonnade, and a portal which fixes very accurately the central axis of the nave. (Fig. 3)

Second is the manuscript written by Alfarano around 1571 which records many dimensions. Alfarano's accuracy was generally confirmed by the investigations of the 1940's, but individual quantities must still be viewed with caution because it is often difficult to determine to which points he worked, and because he usually rounded off his readings to the nearest whole number of sixteenth-century Roman palms.

Third is a sketch plan ascribed to Baldassare Peruzzi. It presents in palms component dimensions from the approximate center of the old nave east to the outer edge of the entrance terrace. Beneath the inked drawing is a pencil substratum repeating the same plan with slight differences in amounts.

Correlation of sources produces a very complete array of critical dimensions. (Fig. 4) These give an over-all interior width of 63.00 m. and an



overall outer width of 65.98 m. It is natural to suppose that Roman architects would have used Roman feet in laying out their designs and at St. Peter's the over-all interior width does produce exactly 213 Roman feet of 295.77 m., the aisle walls are 5.03 feet, and the outer over-all width 223.06 feet. It should be noted that the ratio 223:213 is exactly one-third of  $3\frac{10}{71}$ , the lower limit of  $\pi$  enunciated by Archimedes about 225 B. C. It is surprising that all other transverse dimensions involve quantities with complex fractions of Roman feet that seem to deny any rational use of this unit.

Tests of other units led to the discovery that the 63-meter interior width is exactly 120 Egyptian royal cubits of 525 mm. or 180 Egyptian feet of 350 mm. (Fig. 5) Late Roman metrologists termed the latter a *Ptolemaic foot*. These units, with only slight variations of a few millimeters, had been the standard for Egyptian building since the Old Kingdom. Egyptian commerce and conquest spread their use throughout the Near East. The royal cubit of seven palms, in contrast to the common cubit of six, is recognized as "the cubit and a hand breadth" used by Ezekiel in his ecstatic vision of the restored Hebrew Temple. By extension it is also assumed to be the cubit employed for Moses' Tabernacle and Solomon's Temple.

The conscious use of these Egyptian units at the Vatican is established  
(Continued on Page 12)

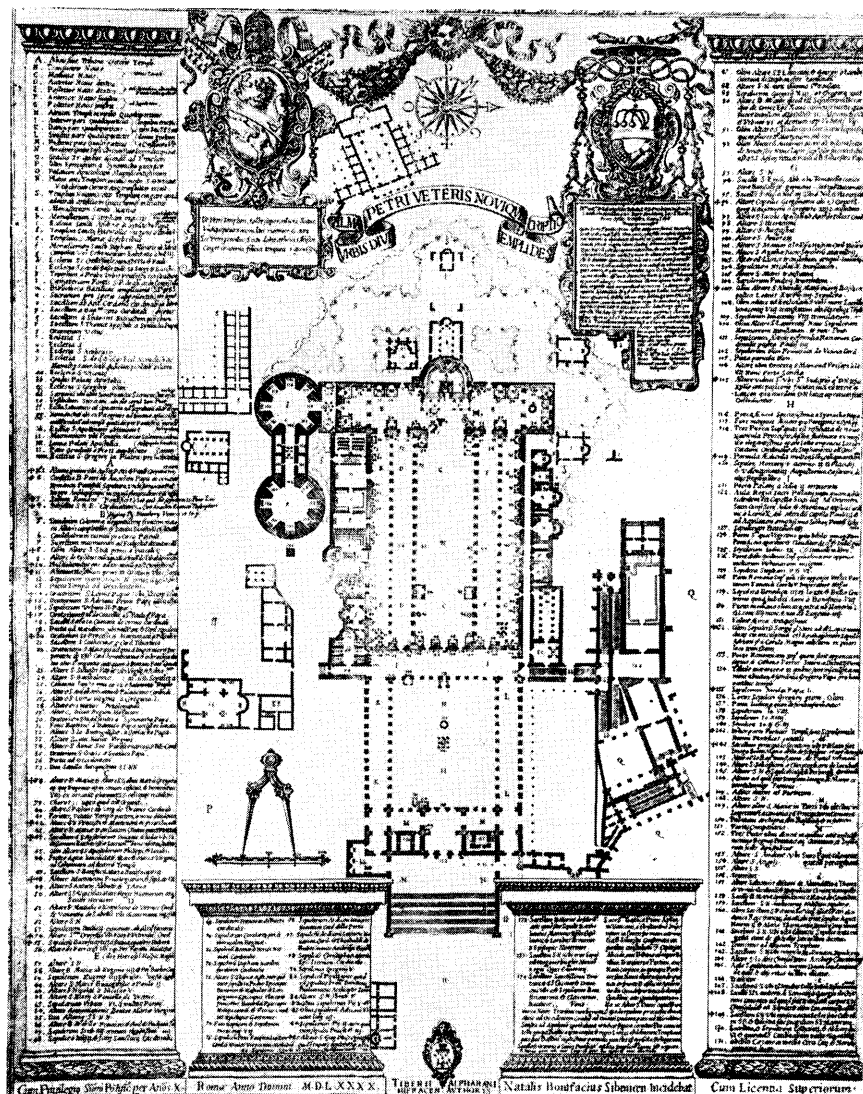


Figure Two. Old St. Peter's: Plan, 1590, by Tiberio Algharni. The side arcades of the atrium were never built. The chapels along the aisle walls are late additions. The western round tomb was connected with the transept probably in the 8th century. The apse shows its arrangement as remodeled by Gregory the Great c 590. The interior indicates the clutter of added shrines and papal tombs.

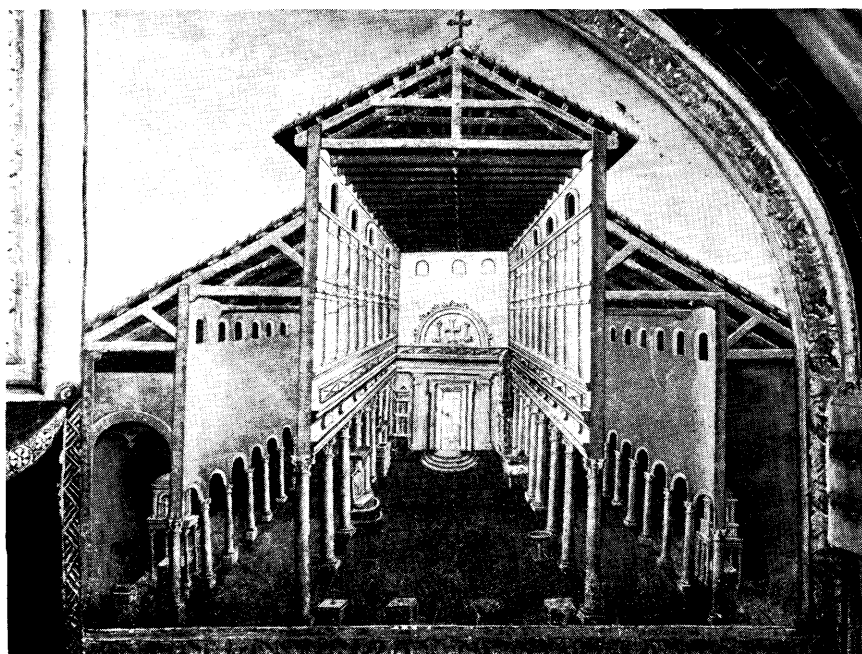


Figure Three. Old St. Peter's: East half of nave, looking west to temporary wall of 1538. Fresco of c 1520 in a chapel of the Vatican grotto. Despite distorted proportions, this painting is an important source for the roof framing and the cycle of biblical frescoes added c 895. About 1460 Pius II introduced the shrine in the end of the south aisle (left) to receive the head of St. Andrew, brother of Peter. The decorative canopy over it has often been misinterpreted as indicating that the outer aisles were vaulted.



# A Venture Toward Verity

(Continued from Page 11)

of  $\pi/3$  previously observed, the ratio 188.50 : 180 produces the exact value of  $\pi$  stated in the second century A.D. by Ptolemy, the celebrated mathematician, astronomer, and geographer of Alexandria. Expressed in sexagesimal fractions, Ptolemy's value was 3 parts 8 minutes and 30 seconds, the equivalent in Roman fractions of  $3 + 1/8 + 1/60$  and in modern decimals 3.14167. This was antiquity's closest approximation of this famous irrational number.

With the fixing of precise units and dimensions, it is possible to explore with unusual confidence the geometry of the Vatican plan. (Fig. 6) The starting point is the apse with its outer diameter of 60 Ptolemaic feet and its inner diameter of 50 (I). Step II shows that the apse projection of 28 feet multiplied by  $\pi$  gives the 88-foot combined width of apse and transept, and that three 60-foot squares define the transept to its inner end walls. Step III shows that the diagonal of the 50-foot inner square of the transept produces 70.71 feet, half an inch short of the 70.75 foot width observed between the center lines of the major colonnades.

The determination of the aisle walls by the factor of  $\pi/3$  has been

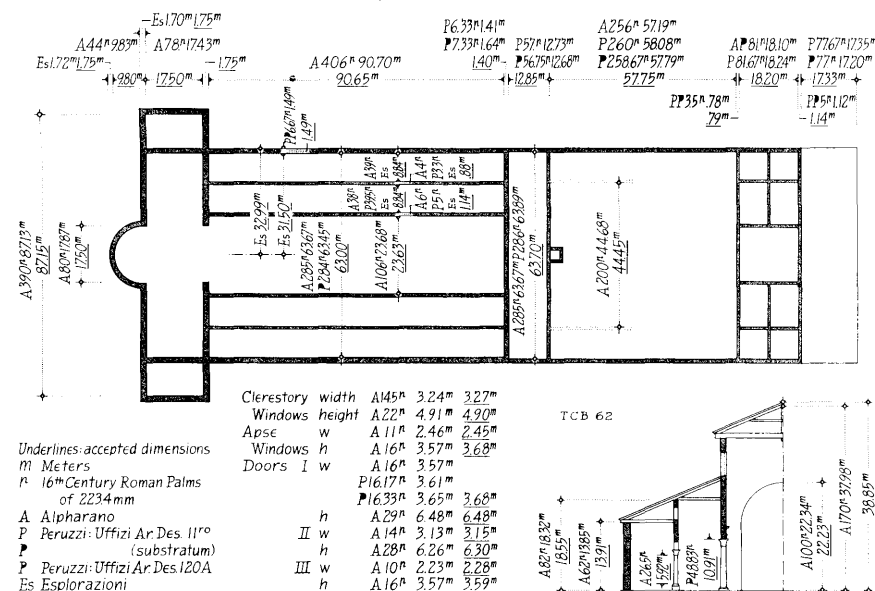


Figure 4. Old St. Peter's: Plan showing sources of dimensions.

by a comparison with the cathedral of Rome, St. John Lateran. The discovery in 1957 of the Constantinian foundations and fragments of aisle walls revealed an outer width of 189 Roman feet. Assuming 4.5-foot walls, the inner width is thus 180 Roman feet. This correspondence with the Vatican's 180 Ptolemaic feet cannot be chance. Similarly the distances be-

tween the centers of the outer arcades both have 127 of their respective units. When the two plans are drawn at scales with the same number of their respective units, their congruity is inescapable.

The Vatican aisle walls are 4.25 Ptolemaic feet in thickness and the over-all outer width becomes 188.50. Far from vitiating the 223 : 213 value

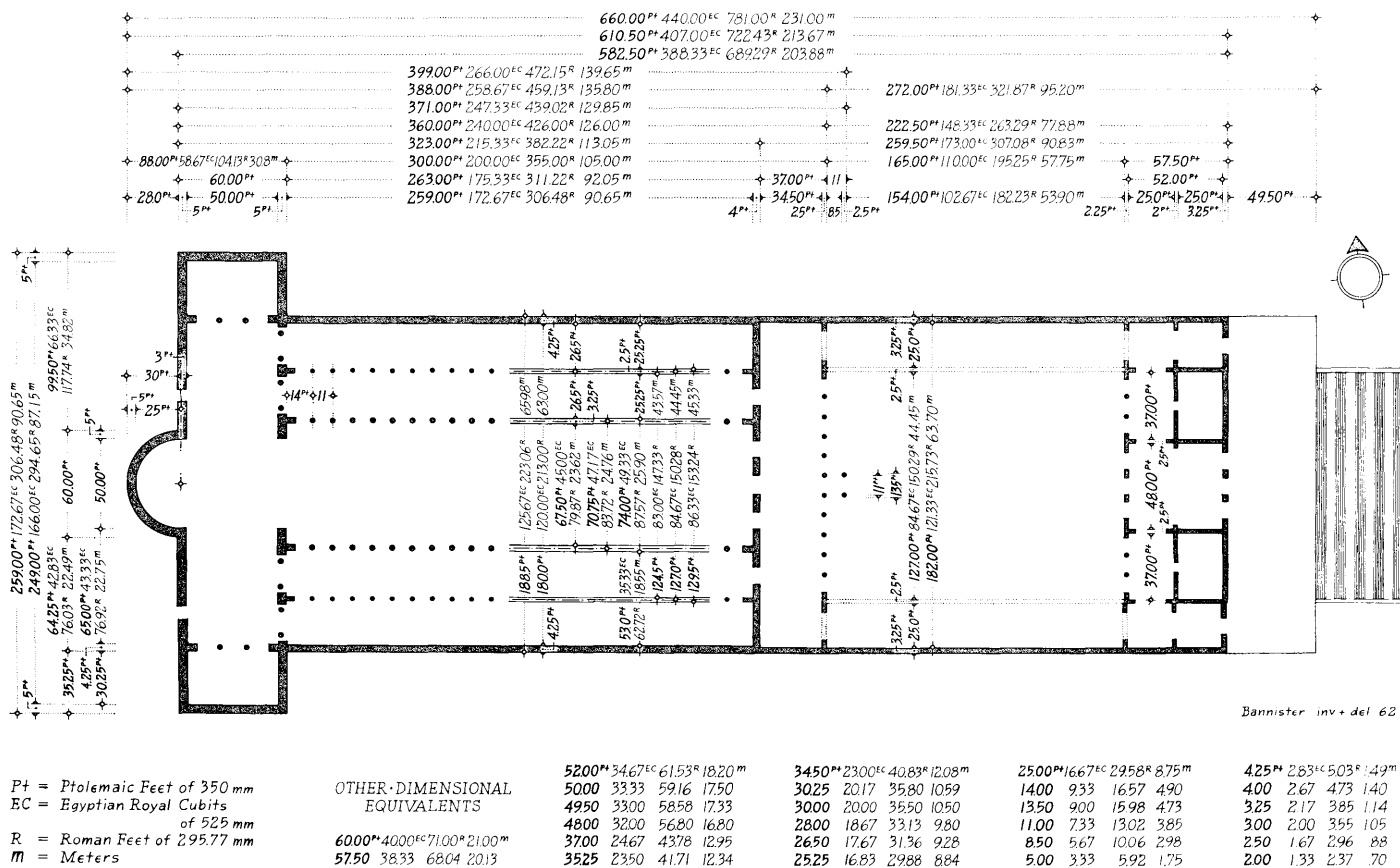


Figure 5. Old St. Peter's: Plan showing dimensions accepted in this study.



width, and the 259-foot inner length of the nave as twice the outer width of the minor arcades. Finally, Step VI demonstrates that the 222.50-foot distance between the eastern faces of narthex and gatehouse is to the 360-foot basilican length as the latter is to

their total of 582.50 feet. This is Euclid's familiar extreme and mean proportion.

Thus, given the apse, a series of simple geometric constructions and ratios locate every major element of

*(Continued on Page 14)*



## A Venture Toward Verity

(Continued from Page 13)

the plan so precisely that, with only two errors, the greater is 1 3/16 inches. The suggestion of such precision will naturally raise scepticism as to the ability of Roman builders to maintain a standard matching all but the most costly modern methods. Nevertheless, the dimensions here accepted agree closely with the available sources and are remarkably consistent.

The use of dimensional units associated with Moses' Tabernacle and Solomon's Temple suggests the possibility that these models may have given further inspiration to Constantine's design. In the sixth chapter of *I Kings*, the temple porch is described as 10 by 20 cubits, "the holy place" or cella, as a double-square 20 by 40 cubits, and 30 high, and "the Holy of Holies," or sanctuary, as a cube of 20 cubits (Fig. 7-I). Squares and double-squares were too common in antiquity to serve as trustworthy evidence of influence, but proportions of 1 : 3 (cella and sanctuary) and 1:3.5 (adding the porch) would be sufficiently unusual to warrant an assumption of direct borrowing.

Rectangle II-B shows the 1 : 3 proportion of the Vatican transept already noted and this ratio is reinforced by the fact that its 40-cubit outer width and 120-cubit inner length are exactly double the specific dimensions of the Temple reported in *I Kings*. Furthermore, the 40 by 20.17-cubit alcoves differ only slightly from the proportion and doubled size of the Temple porch. Rectangle III-E reveals that the 259-foot inner length of the nave is exactly 3.5 times its 74-foot outer width. Rectangle IV-H shows the same ratio between the 188.5-foot over-all outer width and the 660-foot total length, although the multiplication of fractions creates an arithmetical shortage of a quarter-foot. Rectangle III-N demonstrates that the 630-foot length from the eastern end to the apse center is exactly 3.5 times the 180-foot inner width. In Rectangle IV-L the 182-foot inner length of the gatehouse is precisely 3.5 times its 52-foot inner width. Rectangle II-D shows the 294-foot inner length of the transept as exactly three times the 83-foot sum of the transept width and inner radius of the apse.

The observation of one or two ex-

amples of a certain ratio in a plan can easily be rejected as fortuitous. Ratios involving arbitrary or imaginary lines, or slipshod approximations can be attributed to irresponsible naiveté. Here, however, are twelve precise uses of relatively uncommon 1:3 and 1:3.5 ratios all involving major building lines. It seems excessively conservative to deny their cumulative testimony. Because many involve inner and outer dimensions, they were intended, not for esthetic control of visible proportions, but to transfuse the abstract geometry of the plan with an appropriate and meaningful symbolism.

The principal heights also reflect Temple influence. The top of the walls of nave and transept is 60 cubits above the pavement, and thus, like the Temple cella, is one-and-a-half times the transept width. The nave ridge was 111 feet above the floor, and was one-and-a-half times the nave's 74-foot outer width.

The combination in the Vatican transept of Temple proportions and exactly doubled dimensions in Egyptian royal cubits raises the question whether the nave with its 1:3.5:1.5 ratios and its dimensions of 74, 259, and 111 Ptolemaic feet might have been conceived in some other unit that would produce more symbolic quantities. Inspection does indeed reveal that a cubit of 647.5 mm. gives dimensions of 40, 140, and 60 units, quantities exactly double those of Solomon's Temple (Fig. 8). This is the royal cubit instituted by the Persian king, Darius the Great, and mentioned by Herodotus. It survived as the 648 mm. Hashimite cubit of Abbaside Baghdad. A standard of this length was among the gifts which Harun-al-Rashid sent in 801 to Charlemagne who adopted half of it as the Carolingian foot of 324 mm. The use of Darius' cubit in the Vatican nave becomes significant when considered in relation to *Ezra VI* which recounts Darius' protection and gifts for the building of the second Temple at Jerusalem after the return of the Jews from Babylon.

Like Solomon's Temple, St. Peter's faced east and both exhibited an entrance sequence of steps, gate, and courtyard. It follows that the two columns of the central projecting bay of the Vatican narthex reflect the two great pillars, Jachin and Boaz, that flanked the portal of the Temple it-

self. Further, the twenty-two shafts of each nave colonnade and the double-square formed by the outer colonnades conform precisely with the twenty-two posts along the sides of the double-square courtyard of Moses' Tabernacle as described in *Exodus XXVI*.

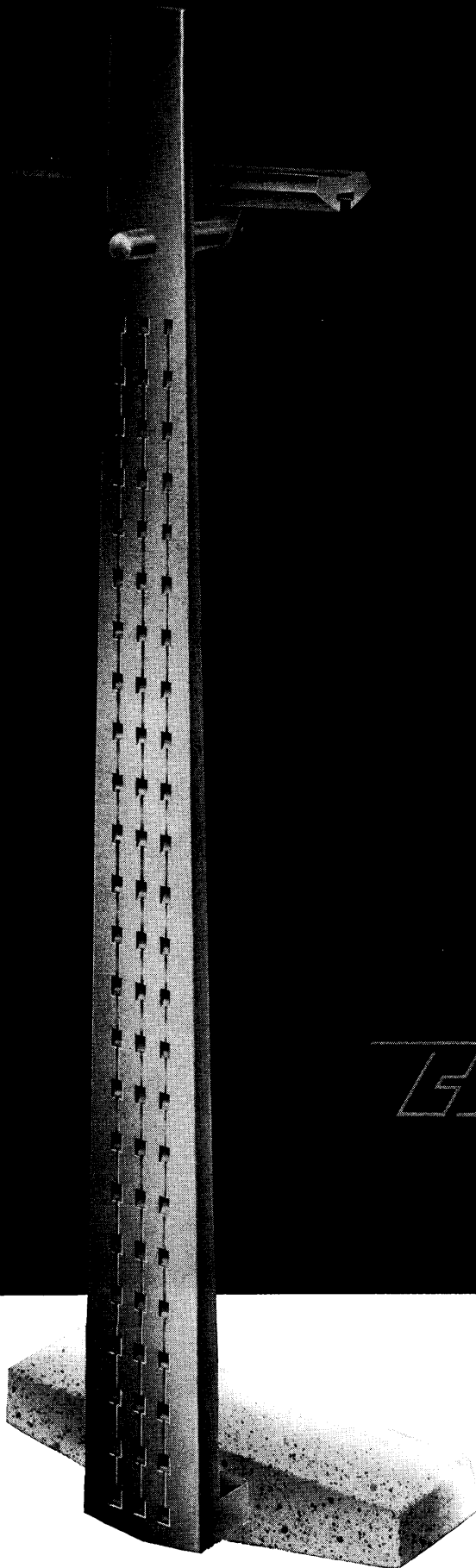
The culminating reference to the Temple occurs appropriately in the focal shrine marking the apostle's grave (Fig. 9). Here, the investigations of the 1940's revealed that the trophy had been encased in marble and this, in turn, was emphasized by a ciborium of four spiral columns, joined by architraves, and capped by two segmental, intersecting ribs. The diagonals of the square formed by the four columns measured 20 Egyptian royal cubits, and, if the height of the ribs has been correctly reconstructed, the vertical distance from their intersection to the bottom of the pit below the shrine in which a deposit of human bones was found was also 20 cubits. Thus, ciborium, shrine, and pit were designed within a cube, set diagonally, each side of which was 20 cubits. This is exactly the size and shape given in *I Kings* for the Holy of Holies of Solomon's Temple.

Two types of numerological symbolism unrelated to the Temple must be noted. In the double square formed by the minor arcades of the Vatican nave, the transverse width converts to 153.24 Roman feet (Fig. 10). The number 153 is frequently recognized by Early Christian writers as possessing mystical meaning because *John XXI* relates that the resurrected Christ appeared to the apostles, who had been fishing without success, and directed them to recast their net, whereupon "Peter drew the net to land full of great fishes, an hundred and fifty and three." Multiples of 153 produce several major dimensions of the plan. Two such units comprise the inner length of the nave and the outer length of the transept.

Finally there is the mystical system based on the Greek and Hebrew use of letters to express numbers (Fig. 11). *Alpha* represented one, *beta* two, and so on to *omega* 800. The sum of the letters in a word formed a *gematria*, the numerical symbol of that word. The book of *Revelation* (XIII, 18) contains a famous example, "the number of the beast," 666, which is usually taken as referring to Nero be-

(Continued on Page 18)





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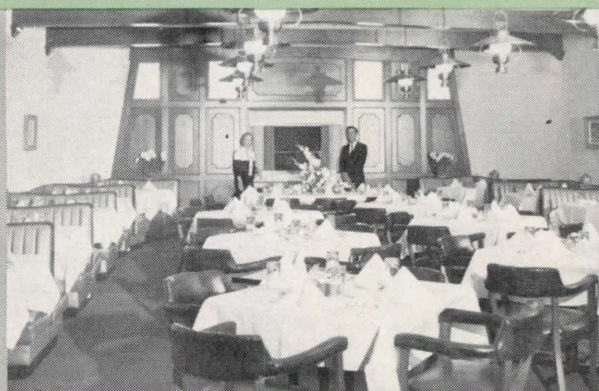
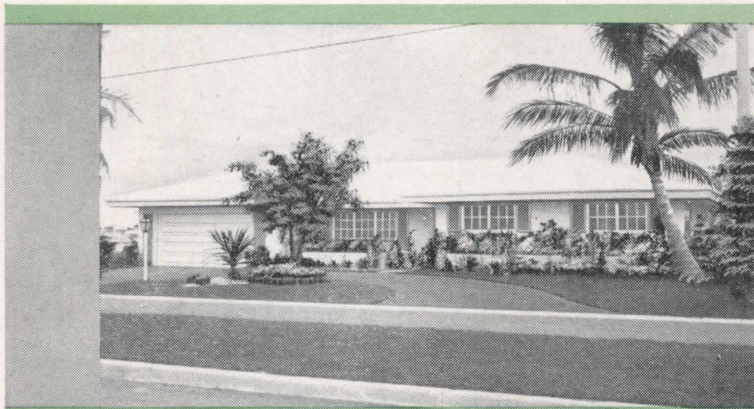
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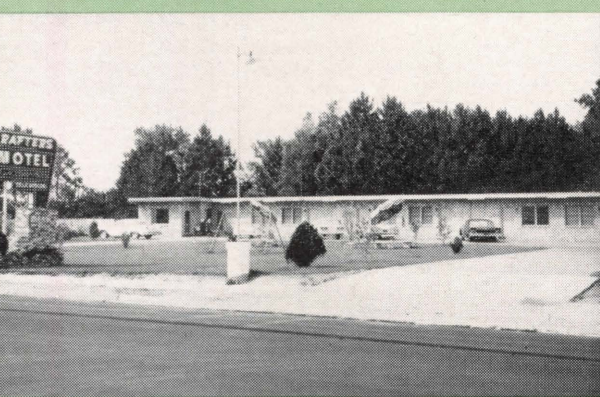
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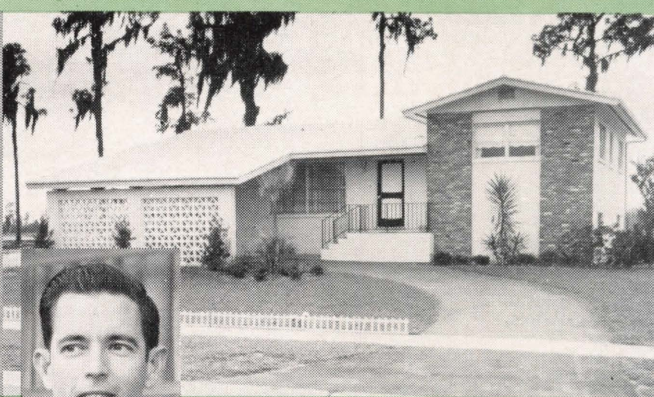
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# A Venture Toward Verity

(Continued from Page 14)

cause "Neron Caesar" in Hebrew produces that total.

Several gematriot appear in the Vatican plan. The perimeter of the

transept is 755 Roman feet which is the sum of ΠΕΤΡΟΣ (Peters). The over-all length of 781 Roman feet is exactly ΠΑΥΛΟΣ (Paul), who appeared with Peter in the apse mosaic. The perimeter of the nave comes to 666 Ptolemaic feet and thus seems to

confirm the beast of Revelation as Nero who instituted the persecution in which Peter was crucified. Other gematritot have been recognized and perhaps many more remain hidden.

The currency of all of these symbolic systems is well established

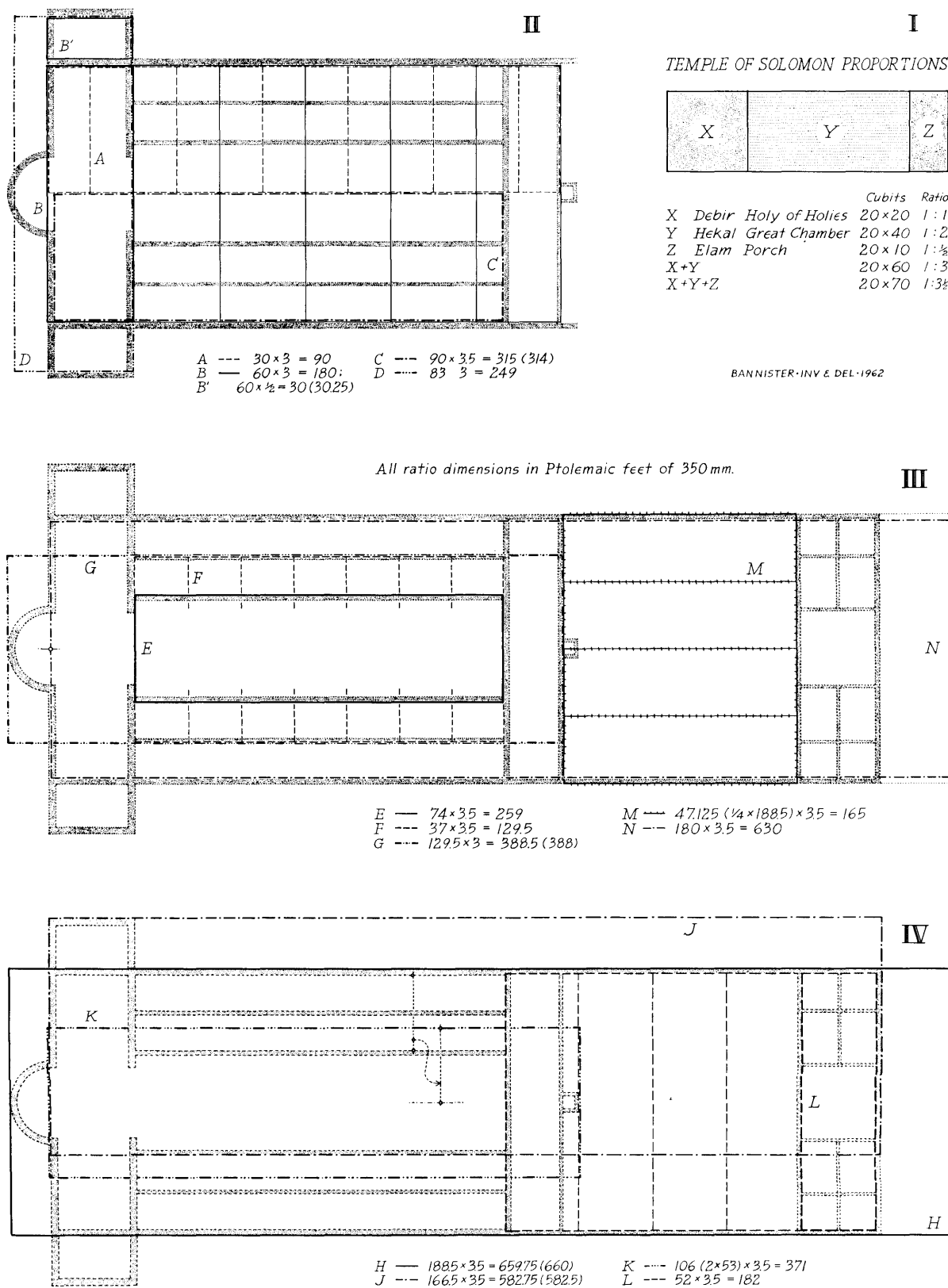


Figure 7. Old St. Peter's: Plan showing use of 1:3 and 1:3.5 proportions of Solomon's Temple.



among Early Christian writers from the second century on. The multiplicity, aptness, and interlocking character of the Vatican applications supply such mutual reinforcement that it is far more plausible to accept their reality than to reject them as mere accidents. Nevertheless, their presence raises the question as to what kind of mind was responsible for them. No doubt Constantine assigned to the Vatican project the best talent of the imperial building staff, but, though Vitruvius stresses the study of geometry, music, and liberal arts by architects, the symbolism of the Vatican design seems to demand a clerical rather than a technical background.

It is tempting, therefore, to see at the Vatican the influence of Constantine's chief theological counsellor, Eusebius, bishop of Caesarea on the Palestinian coast. Eusebius' fame rests primarily on his *Ecclesiastical History*. Book X includes the author's oration delivered in 315 at the dedication of the Cathedral of Tyre. In the final climax he traces a moving analogy between the physical structure of the new edifice and the Saviour's construction of the spiritual church with the souls of true believers. Throughout are sprinkled apt allusions to Solomon and his Temple.

Eusebius' keen sense of history inspired a lively interest in scriptural topography and archaeology. His *Onomasticon* is still the fundamental account of biblical place names. Unfortunately, his *Description of Judea* has been lost. As part of these works or as an independent study he prepared a plan of Jerusalem and a reconstructed plan of Solomon's Temple. It was probably Eusebius who at Nicaea awakened Constantine's concern for the desolated Christian sites of Palestine and induced the emperor to dispatch his mother, Helena, on her famous pilgrimage. And, finally, since Eusebius doubtless participated in the programs of the new Palestinian basilicas, the functional similarities between them and the Vatican reinforces the suspicion of his influence on the western design.

Whoever initiated it, the choice of Temple symbolism for St. Peter's was singularly appropriate. It not only recalled the most famous structure of biblical history, it not only justified an impressive monumental design, it not only evoked Palestinian connota-

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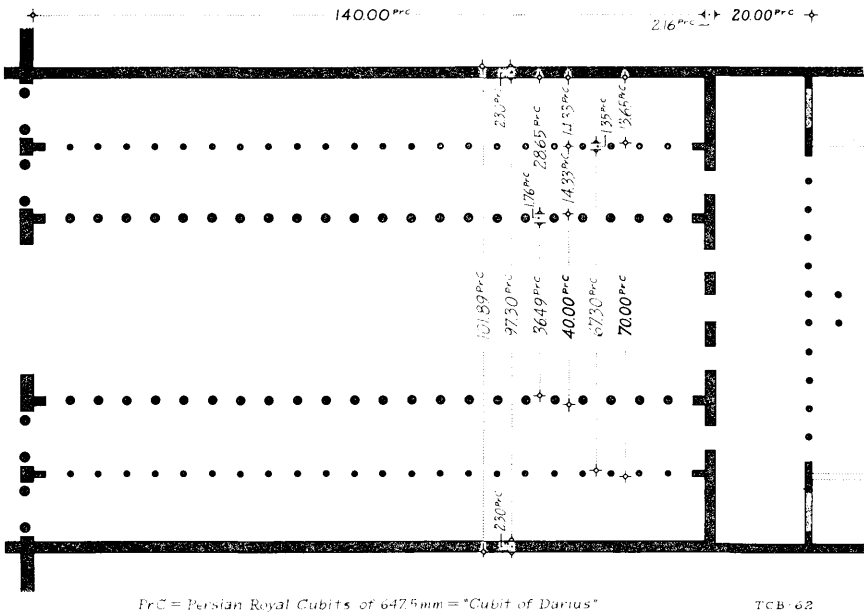


Figure 8. Old St. Peter's: Nave plan showing dimensions in Persian royal cubits.

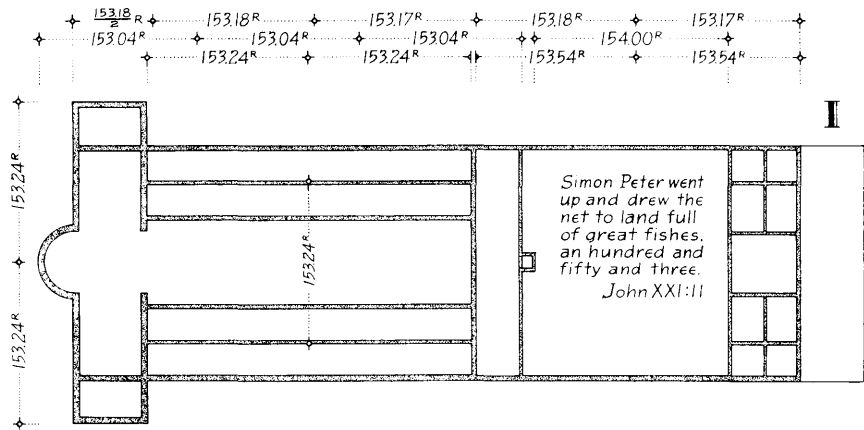


Figure 10. Old St. Peter's: Plan showing dimensions of 153 Roman feet.

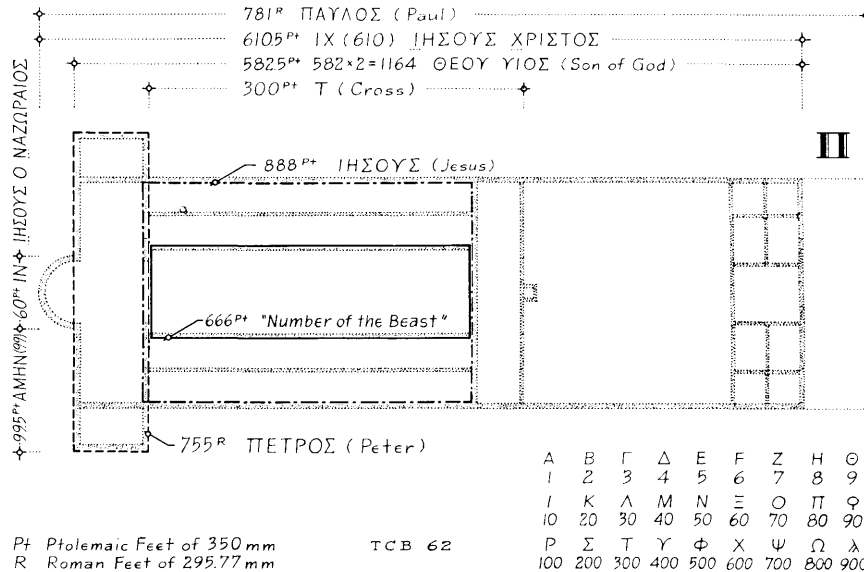


Figure 11. Old St. Peter's: Plan showing gematria dimensions.

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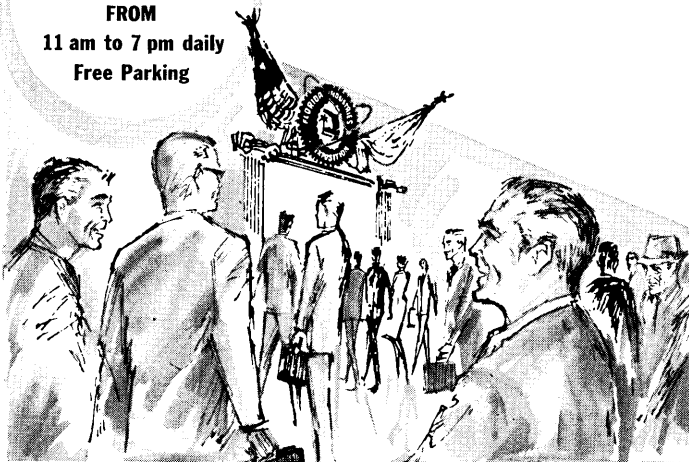
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## Aluminum...

*(Continued from Page 9)*

ant finish compares quite favorably to porcelain on steel and in addition it is extremely resistant to thermal shock and can be drilled or sawed without spalling. Because of the added rigidity of the porcelain enamel, lighter gauges may be used thus combining hard durable finish with light weight.

Porcelain enamel panels are available in a full range of surface treatment from high gloss to matte finishes and in an almost unlimited range of colors. Costs vary, of course, but in general they fall in the range of the anodic hard coats. This is considerably more than the economical synthetic resins. Special alloys have been developed by the aluminum industry for this process and in some cases the process can be used with common alloys. One final fact of special interest to Florida architects is that no deterioration of surface has been found after 480 hours of test using a 20 per cent salt spray.

This brings us to the highly publicized and widely used chemical and electro-chemical finishes. These are the most extensively used finishes in the architectural market and without a doubt the most confusing.

The least complex and lessor known of this family are the conversion coatings. They are also among the cheapest finishing procedures with respect to equipment and time. Chemical finishing has been defined as any process in which reagents are used to dissolve or chemically react with the metal surface to alter its form or to produce a tightly adherent chemical compound. Most of the processes under this category consist of a simple dip tank in which the material is placed under given time and temperature controls until the operation is complete.

Some of the conversion coatings such as Bonderite, Iridite, and Alodine produce rather delicate translucent green and gold colors and find limited use as decorative finishes. Unfortunately in most cases the color consistency has proven difficult to control and falls short of architectural requirements for matching and uniformity. Therefore most chemical treatments find their greatest use as pre-treatments for the organic or

*(Continued on Page 23)*



Howard Johnson Motor Lodge, Charlotte, N. C. Architects: Snow and Associates, Raleigh, North Carolina, and Rentscher and Associates, Coral Gables, Florida. Structural engineers: Driver and Spooner. Contractors: Davidson and Jones, Raleigh, North Carolina.

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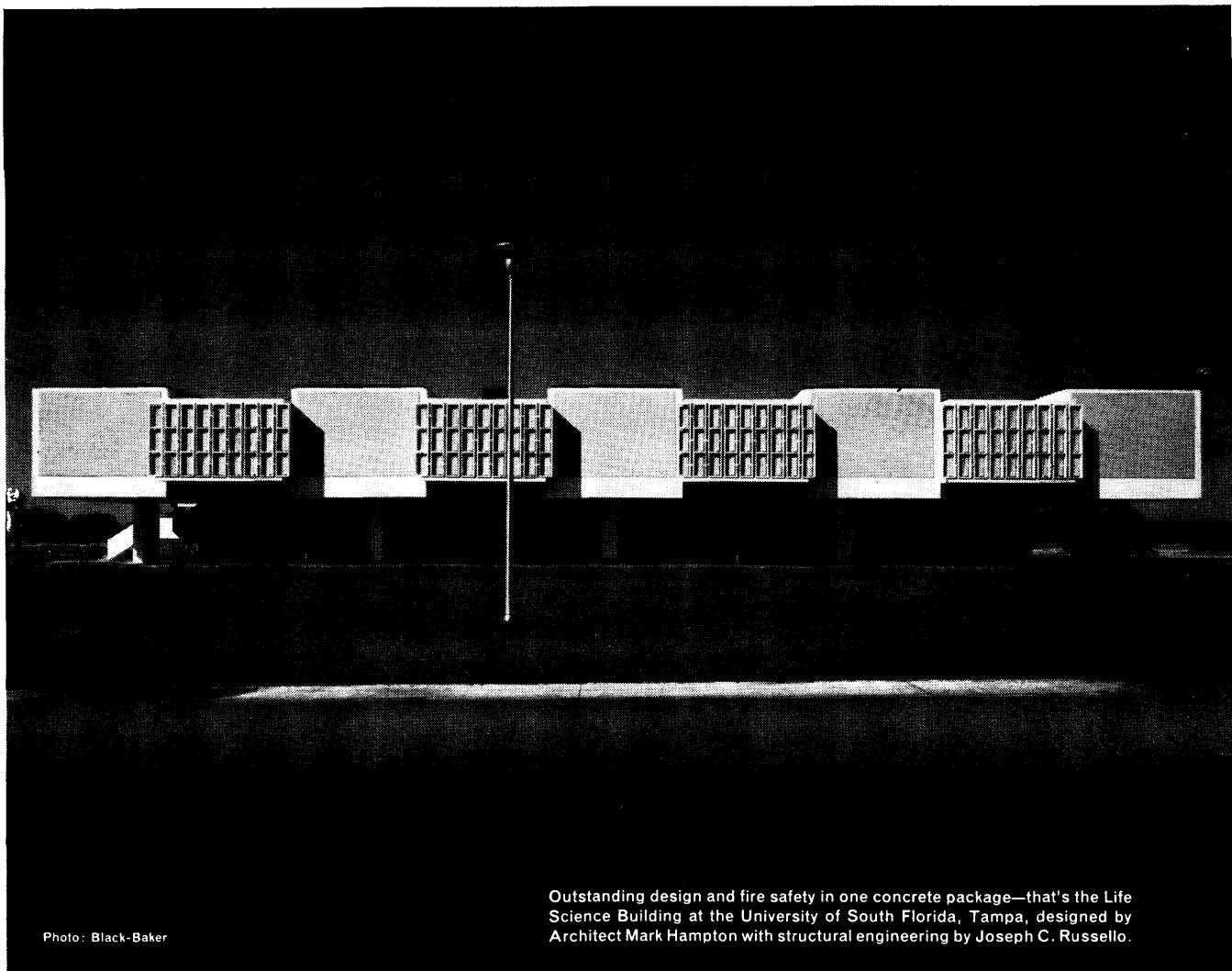


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## Aluminum...

(Continued from Page 20)

electro-chemical anodic processes. The one major exception is the caustic etch which serves not only as an excellent pre-treatment but produces a very handsome satin finish widely used in architectural applications. Caustic etching removes the natural oxide coating on aluminum so it is usually followed by an anodic treatment or the application of lacquers, enamels, etc. This process also minimizes surface defects.

The electro-chemical anodic coatings (sometimes referred to as "alumilizing"—a patented trade name) are not nearly as mysterious as they seem. It is only necessary to understand the basic system.

Anodizing is an electro-chemical method of increasing the formation of the natural oxide coating by immersing the work in a tank containing an acid solution (usually 15 per cent sulphuric) and sending an electrical current through the solution. The aluminum work piece becomes the anode and the tank or lead cooling coils the cathode. The procedure is carried out as follows: The work is

first given a pre-treatment which usually consists of a light caustic etch. (Surfaces which are to have a high gloss finish are polished and buffed before anodizing.) The material is then rinsed and desmutted in a nitric acid bath. After a second rinse the work racked on titanium or aluminum "work bars" is placed in the anodizing tank. Oxygen released at the anode combines with the aluminum to form aluminum oxide (amorphous hydrated alumina). The current requirement is about 12 to 15 amperes per square foot at a voltage of about 15 to 18. The current continues to decrease steadily until the operation is completed.

The tank temperature during anodizing is held to about 72° F except where a dye operation for inducing color is to follow. In this case the temperature may be allowed to go as high as 85° in order to obtain a more porous surface to facilitate dye absorption. It should be noted however that the more porous surface does decrease corrosive resistance. Normally about half an hour in the tank should produce a coating with an average thickness of 0.0004" and an average weight of 17 mg/sq. in. After one

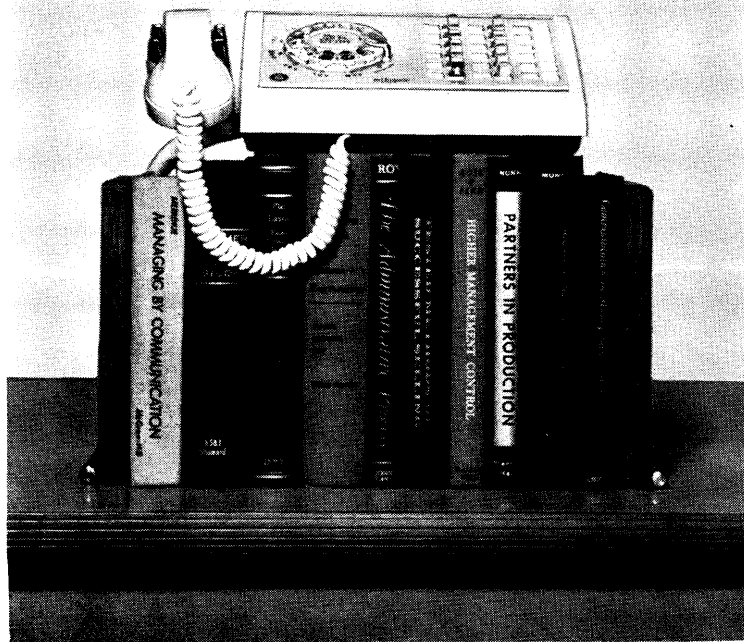
hour the average thickness should be 0.0008" and the weight 35 mg/sq. in. It is possible to load a tank to a point where the electrolytic action is sufficiently reduced to the point that substandard coating thicknesses and weights result. For this reason it is strongly recommended that thicknesses and weights rather than time be used to specify sulphuric acid anodic coatings. Following the anodic treatment, the work is rinsed and then sealed in a hot water bath. The action of the hot water converts the amorphous hydrated alumina to chemically inactive crystalline alumina mono-hydrate boehmite. A final rinsing and drying completes the process.

If the material is to be colored by the dye method, it is placed in a bath containing the dye solution while still in a porous condition. The dye is absorbed into the porous coating. Following a rinse the work is placed in a sealing tank containing a nickel acetate-boric acid solution, held at about 200°F for two to ten minutes.

Alloying ingredients in the metal have a definite effect on the final result. For example, sheet alloy 5005 provides an excellent match with ex-

(Continued on Page 24)

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## Aluminum...

(Continued from Page 23)

trusion alloy 6063 after anodizing, while alclad 3004 sheet results in a poor match. To obtain the match it is advisable to refer to charts published by aluminum producers or consult a representative of a fabricating firm.

Color matching of dyed anodized material has sometimes presented a problem. In addition, sunlight can cause objectionable fading. New approaches have therefore been taken by the industry in order to develop more satisfactory anodic color systems. One of these utilizes the precipitation of inorganic compounds and is carried out one step after anodizing. The most notable example of this system is ferric ammonium oxalate gold. A second approach has been to take advantage of the color deviations caused by alloying ingredients. For example, alloys containing higher percentages of silicon tend to cause the metal to turn grey during anodizing. Thus by controlling the amount of silicon and the anodizing time, a series of greys from very light to almost black can be obtained without

the use of dyes. Here the old bugaboo of the dye has been eliminated, but color matching remains a problem.

During World War II hard, abrasive-resisting coatings were required for the aircraft industry. It was learned that this type of coating could be produced by drastically reducing anodic bath temperatures and increasing voltage. This practice, in conjunction with a modified sulphuric acid bath not only produced the type of coating required, but there was a side effect—color. However this process, known to the trades by the names of “martin” and “sanford” hardcoat, had serious drawbacks for architectural applications. First, the colors which ranged from bronze to black were difficult to control. Second, the anodizing procedure required refrigerating the bath to around 20° and using dangerously high voltages. Third, the coating thicknesses were very heavy (up to 5 mils) and thus were subject to crazing. A fourth disadvantage was that this type of coating was obviously quite expensive. A more recent version of the hardcoat process developed by the Aluminum Company of America, “Duranodic

100” has been more successful.

The first major break through for architectural colors in this category came about four years ago when Kaiser Aluminum and Chemical Sales Inc., after years of development and testing, introduced “KalcOLOR”. In this process the acid bath is replaced by one using a proprietary compound. Refrigeration is used to hold the bath temperature to around 70°F and voltages are substantially increased over those of sulphuric acid anodizing. The resultant colors are a function of alloy, electrolyte, time, and temperature. They range from light, subdued golds, thru greys and bronzes to black. Inasmuch as controlled alloys are used, color match can be kept to much closer tolerances than with dye processes. The coating is highly resistant to corrosion and abrasive action and it is light fast.

Recently Alcoa released a similar process called “Duranodic 300”. Both KalcOLOR and Duranodic 300 offer the architect fade-resistant, durable, well matched, anodic colors at a price only slightly above that of dyed color anodizing. It should be noted coating

(Continued on Page 32)

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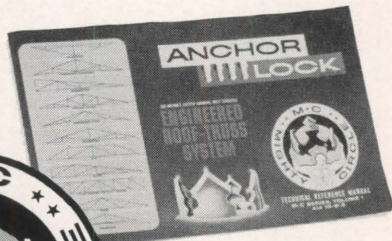


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\*Available On Request: Detailed Engineering Survey by Dewey R. Winchester, P.E., Charlotte, N. C.

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# The 1963 . . .

## Legislative Program

By ROY M. POOLEY

President  
Florida Association of Architects

For nearly two years the Government Relations Committee has labored long and well with problems concerning the construction industry and the Legislature of the State of Florida. A number of general and specific recommendations have been presented to the FAA Board for review and comment and the delegates to the 1962 FAA Convention unanimously adopted the general program recommended by the Board. Thus, a program has been set.

Our first concern is quite naturally with any legislation which affects directly the practice of architecture in Florida. We don't take a casual view of any proposal which might adversely affect the profession—nor would anyone else whose chosen career required ten to fifteen years of education and

experience to mark a point of beginning. On the other hand, we also have an abiding and emphatic interest in all other matters which concern man's environment in general, and the construction industry in particular.

Consequently, we are very much concerned with such matters of legislative interest as planning and zoning, building codes, industrial development, urban renewal (too bad proper planning was neglected originally), educational facilities, government buildings, and many more. We have continually expressed our interest by serving in various capacities with study and action groups such as planning boards, investigative committees and advisory groups. Investigation of damage caused by hurricane Donna and consultation with a sub-committee

studying a redevelopment plan for the State Capitol are specific examples, as is the appointment last week of one of our members to a special Task Group created by Governor Bryant to plan for the eventuality of nuclear attack. Yet another example is the months of diligent work by our past president on the special Lay committee attempting to write a more equitable Lien Law.

Because of their unique position in the construction industry—as professionals, thoroughly familiar with its problems, but more directly representing the interests of the owners of buildings (without whom there would be no industry)—architects afford our legislators with a far more balanced, more objective point of view than can any other segment of the industry. Our advice has been frequently sought and we stand always ready to serve the best interests of our communities, State and Nation.

Of particular interest to us in the 1963 session of the Florida Legislature is revising the "Architects' Law."

Landscape architects are greatly interested in obtaining a registration act

(Continued on Page 28)



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Institutions, country clubs or private homes—if your plans call for a tennis court, be sure to check into an installation by Perico. Perico is a blue grey slag type material which is laid on a bare earth surface in four packed, graduated layers. The result is a porous, non-glare surface that is resilient and gives a natural action to the ball.

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# Gasgram

MARCH, 1963

Good **NEWS** about Natural Gas...

MIAMI SWITCHEROO! Miami's big downtown Robert Clay Hotel has made major switchover to natural gas. Central steam heating plant and hot water system in hotel proper were converted from fuel oil. Two natural gas water heaters also replaced four electrics in pool-cabana area. Additional installation to heat swimming pool planned. Reports manager Vernon Slaughter, "Very satisfactory performance." Rumor Adds: Watch for another big downtown Miami hotel to make natural gas news soon.

PRIZE CUSTOMER. Like the doctor who takes his own medicine, ICED Corporation of St. Petersburg which specializes in natural gas engine-driven air conditioners, reports highly satisfactory results (and no complaints) from 50-ton ICED installation in its own plant at 6501 - 49th Street, North. Firm will install 30-tons additional in near future. "SE HABLA ESPANOL" - In hospitals where failures can be critical, natural gas dependability speaks a universal language ... was chosen for cooking, heating and hot water systems in Centro Asturiano Hospital serving Tampa's Spanish-speaking population.

NATURE'S BEST NOT GOOD ENOUGH. Improving on Clearwater's attractive climate takes some doing, but city fathers have done just that by installing natural gas air conditioning in the city's great new Memorial Civic Center and in the advance-design Public Library. Installations are of the ICED (Internal Combustion Engine Driven) type, rated at 55 and 72 tons respectively, and scoring high on dependability and economy.

ADD OIL-TO-GAS BOILER CONVERSIONS. Velda Cooperative Dairies, Jacksonville, is latest big dairy to convert boilers from oil to natural gas. Bell Baking, St. Petersburg, changed over two Fitzgibbon boilers. Reports Plant Engineer Weaver, "We were paying 8¢ per gallon for oil. We're showing substantial savings with natural gas - and our operation is cleaner, safer, more efficient."

WHAT NEXT! Lakeview Manor, new St. Petersburg nursing home is all-gas with a vengeance! In addition to natural gas cooking, water heating, warm-air furnaces and laundry dryer, institution eases sanitation problems with specially designed, gas-fired bedpan washer.

LIGHTS ACROSS THE BAY. Nobody misses Outrigger Inn, one of the Gulf Coast's finest restaurant-motel operations. In addition to gas cooking, heating, water heating, the Outrigger's spectacular gas-fired waterfall fountain display can be seen for miles as motorists approach across Tampa Bay's Sunshine Skyway.

REAL COOL SUBURB. Amazing Miami oceanfront suburb of Golden Beach has set all-time percentage record for natural gas air conditioning: Over 20% of all natural gas customers. Average installation is 5-tons, plus. What's the biggest installation in town? The Town Hall, of course.

"NO SWEAT". Large-volume air conditioning problem presented by massive drill floor in North Miami National Guard Armory was easily solved with two 25-ton Arkla absorption-type natural gas air conditioners.

MORE HEATERS FOR STETSON HATTERS. Five new dormitories at Deland's Stetson University depend on dependable natural gas for automatic heating and hot water systems. This expands previous installations at University served by Florida Home Gas, Deland.

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## A Venture Toward Verity

(Continued from Page 19)

tions intimately linked with both Christ and Peter. But in celebrating the new Christian victory it assuaged symbolically the destruction of Herod's splendid Temple, whose actual furnishings Titus had brought to Rome in 70 A.D. as military trophies. Upon completion of Vespasian's forum, they were deposited in its Temple of Peace and there they were still exhibited in Constantine's day.

The appeal of the Vatican symbolism was so intellectual in character that later generations transmuted it into the legend that some of its building materials, particularly the spiral columns before the apse, had been brought from the Temple ruins in Jerusalem. In the sixteenth century, Alphonso dutifully recorded this attribution. Garbled though it was, it can now be recognized as preserving into relatively recent times the residue of an initial truth that transformed inert masonry into a meaningful witness to ancient prophecy and its triumphant fulfillment.

## Legislative Program...

(Continued from Page 26)

which will provide appropriate recognition of that profession. Their case is a good one. Men who expend the time, effort and money required to achieve professional status as Landscape Architects are most certainly entitled at least the protection afforded so many others, and the public is most certainly entitled to know that a person offering his services as a Landscape Architect is, in fact, so qualified.

After deep and thoughtful consideration, we have jointly concluded that the interests of both professions and the public can best be served by expanding the Architects' Registration Act to include Landscape Architects.

Because the activities of both professions are closely related, it is felt they can be properly regulated by a single board and result in greater harmony between them, and less cost to the public. Should this reasoning prove wrong, it seems likely to be much easier to create separate boards later than to combine them later.

*There are also other objectives.*

When the present statute was en-

acted in 1941, among others, design of residences costing less than \$10,000 and other buildings costing less than \$5,000 were exempted from its provisions. Although these exemptions were appropriate at the time, inflation has now made these provisions of the law both inadequate and unenforceable. The result has obviously been widespread violation of the law, and a tacit ignoring of the violations. Such a condition would seem to erode the strength of all our laws.

We seek to substitute equivalent building areas for the monetary values established in 1941.

As buildings become more complex, the demand made on the Architect's skill and knowledge increases, at least proportionately. Practical experience has proven additional study and work experience are required to adequately prepare applicants for the Architects Examination. We therefore wish to increase the required office experience for applicants from one year to three, in line with the recommendations of the National Council of Architectural Registration Boards. The practical effect expected of this change will be to increase the percentage of success-

(Continued on Page 31)

## Planning an apartment? motel? hotel?

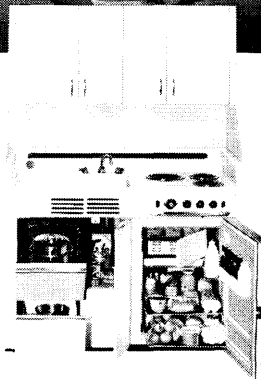


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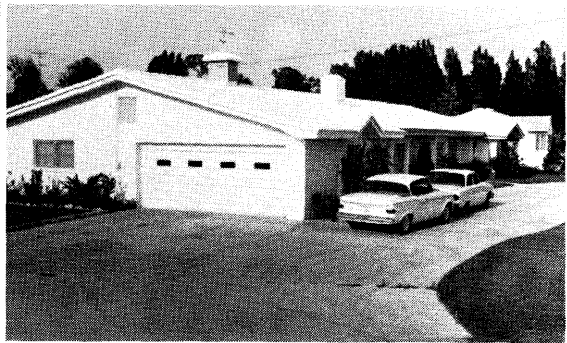
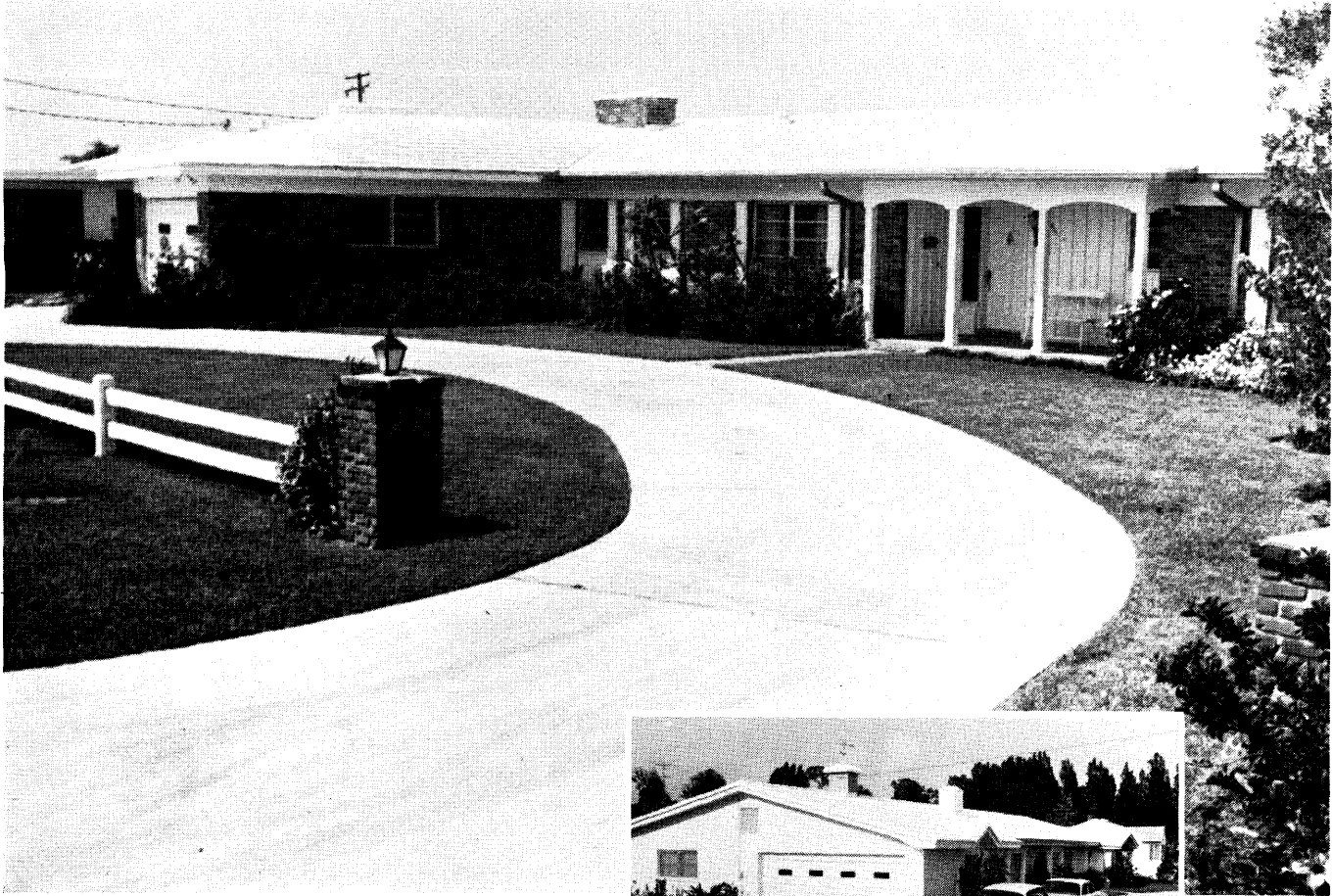
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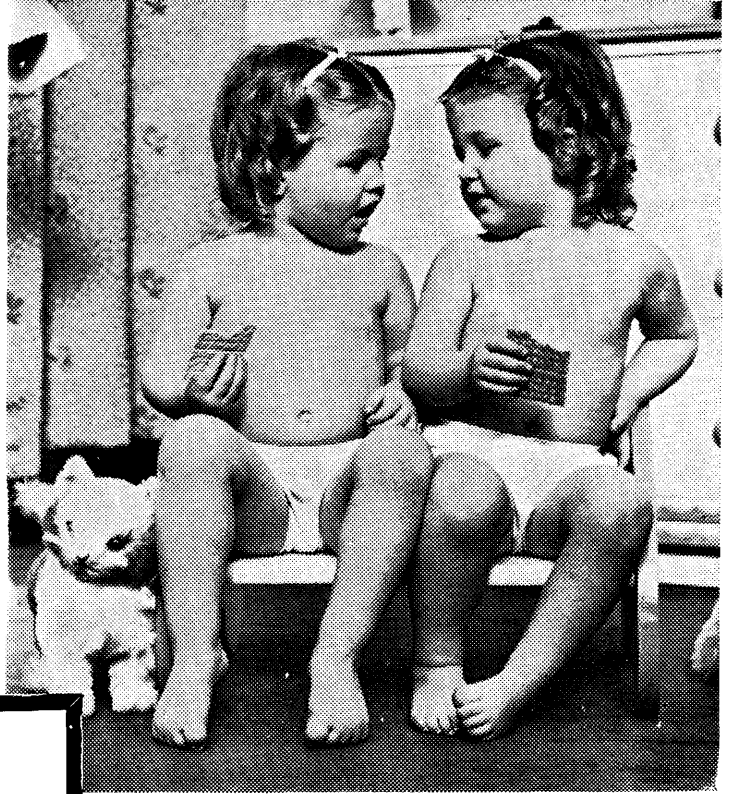
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## Legislature Program...

(Continued from Page 28)

ful examinations, decrease the cost of examinations, and further improve the competence of newly registered architects.

Another change necessitated by inflation is the requested increase in the maximum fee which may be charged for annual renewal of registration. The present maximum was set in 1941 and renewal charges have been at that level for several years. Increasing demands made on the Board for examination, investigation and enforcement activities, coupled with greatly increased cost of these activities, now strain the resources of the Board considerably. It is felt the new ceiling of \$50.00 will provide adequately for operations over a period of many years. An immediate increase in renewal fees is not expected to be required, nor is it expected that they will ever be increased beyond the extent necessary to accomplish the requirements of the profession.

Inclusion of Landscape Architects under the Architects' Registration Act is, of course, a major revision of the statute. Otherwise, the revisions sought are relatively minor, but nonetheless of considerable importance to us. These changes will most certainly not produce the ideal legislation we would so fervently like to achieve. A great many architects will not be satisfied with the limited revisions, however, they do represent a considerable improvement and there is no apparent reason for the Legislature not to make the changes requested. Progress, however slow, is still progress.

Your Government Relations Committee will be in close contact with the Legislature throughout the session and will review all bills of interest to us. Each Chapter will be kept advised of the official position of the Association on matters of importance to us and will be requested to cooperate with the committee when necessary.

A profession united behind its spokesmen commands the respect of legislators as well as clients. Our objectives and policies have been derived from long study and thoughtful evaluation. They have been debated and reviewed to a point of virtual unanimous agreement by your Board of Directors over a considerable period of time, and they deserve the full support of every architect in Florida.

MARCH, 1963

JOHN F. HALLMAN, JR., Pres. & Treasurer  
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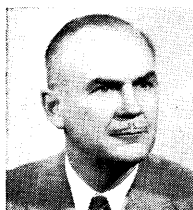
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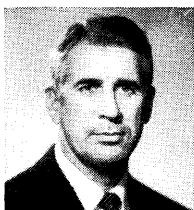
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## Aluminum...

(Continued from Page 24)

density is a major factor in the durability of these finishes. Therefore coating thicknesses of Kalcolor and Duranodic 300 are somewhat meaningless when compared to those of conventional sulphuric acid anodizing.

One final word of warning concerning color anodized aluminum. Before specifying any of the above color finishes dye or otherwise for use on castings, consult a representative of the fabricator or of one of the major aluminum producers. The porosity of castings is quite variable thus making it difficult to produce uniform color coating thicknesses in anodic finishes. This condition does not however exist in the case of forgings. They take color very well.

A full discussion of all of the finishing processes is impossible within the allotted space thus the material has been restricted to those most closely related to architectural applications. Additional and more detailed information is available to the architect on some of the processes described above.

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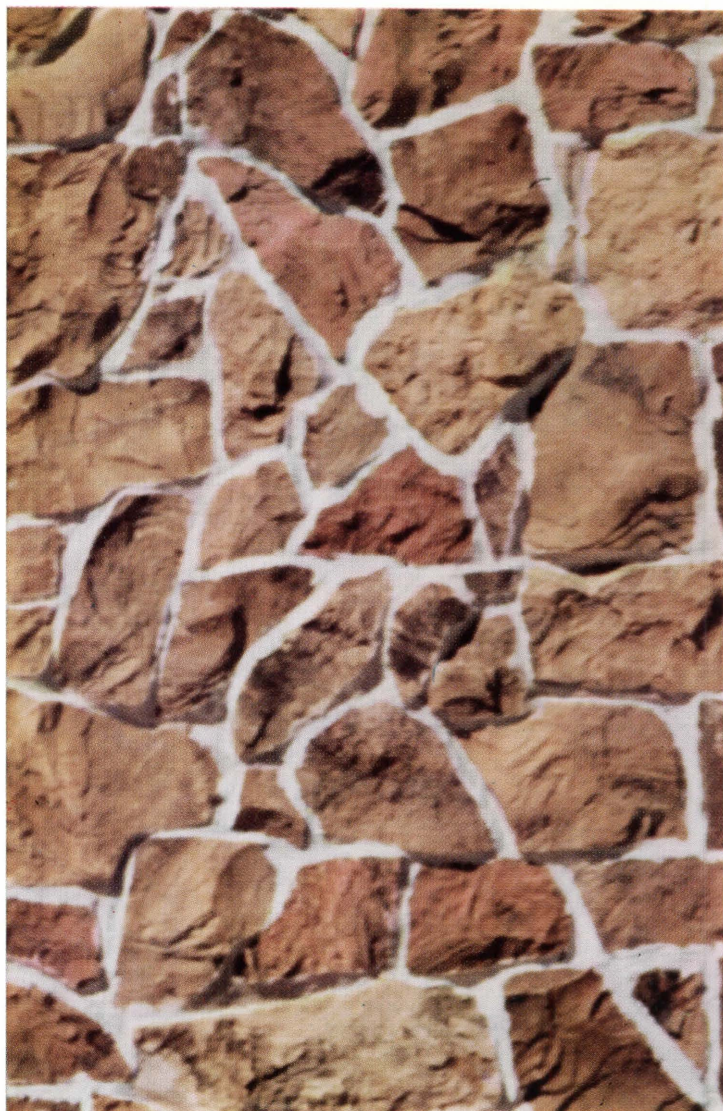
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